Retinal Venous Occlusive Disease

Vernon K.W. Wong MD*

Occlusions of the retinal venous system are the second most common retinal vascular disease after diabetic retinopathy. Patients present with sudden vision loss or may be asymptomatic. Retinal vein occlusions are classified into branch or central occlusions. Laser photocoagulation and vitreoretinal surgical techniques are used to treat the complications of macular edema, neovascularization, vitreous hemorrhage and retinal detachment.

Retinal Venous Occlusive Disease

Occlusions of the retinal venous system are the second most common retinal vascular disease after diabetic retinopathy.[1,2] Retinal venous occlusions are classified into branch retinal vein occlusions (BRVO) and central retinal vein occlusions (CRVO).

Branch Retinal Vein Occlusion (BRVO)

Clinical Presentation

Branch retinal vein occlusions usually occur in people in their 60s, affecting men and women equally.[3] Patients may notice an acute, painless loss of vision if there is macular edema, ischemic maculopathy, or intraretinal hemorrhage involving the fovea. A BRVO occurring in a nasal retinal quadrant can be asymptomatic. A longstanding BRVO may present with floaters or an abrupt decrease in vision from vitreous hemorrhage or retinal detachment.

In a recent BRVO, ophthalmoscopy can reveal intraretinal hemorrhages in a segmental pattern, cotton-wool spots, and macular edema. In a chronic BRVO, collateral vessels, macular retinal pigment epithelium changes, and neovascularization of the retina or disc may develop. (Fig 1)

Branch retinal vein occlusions occur most commonly in the superotemporal retinal quadrant, and about 10% of patients with BRVO will develop retinal vein occlusion in the fellow eye.[4,5] Systemic hypertension is a risk factor for a BRVO.[3-5]

Classification

Branch retinal vein occlusions are categorized into ischemic and nonischemic types. A nonischemic BRVO is defined as less than 5 disc diameters of retinal capillary nonperfusion as documented by fluorescein angiography, while an ischemic BRVO is defined as greater than 5 disc diameters.[3,4]

Complications

About 50% of patients with BRVOs have a final visual acuity of 20/40 or greater.[4,5] Patients with nonischemic BRVOs may lose vision secondary to macular edema. Patients with ischemic BRVOs can lose vision from macular edema, ischemic maculopathy, vitreous hemorrhage, or retinal detachment. If ischemia occurs in the macula, the patient may notice central vision loss, while ophthalmoscopy may not reveal macular edema. A fluorescein angiogram will demonstrate an enlarged and irregular foveal avascular zone. (Fig 2)

Approximately 30-40% of patients with ischemic BRVOs develop neovascularization of the retina or disc.[2,3,6] In approximately 60% of the patients who develop neovascularization, traction from the vitreous causes these new vessels to bleed leading to vitreous hemorrhage.[2,6] Rarely, traction on the new vessels may lead to a traction retinal detachment or a retinal tear that progresses to a rhegmatogenous retinal detachment.[2-6]

Treatment

Patients with a nonischemic BRVO without macular edema are followed clinically for the development of macular edema and for progression into an ischemic BRVO and its complications. The Branch Vein Occlusion Study was a multicenter, randomized, controlled clinical trial designed to answer if argon laser photocoagulation could improve visual acuity in eyes with BRVO and macular edema reducing vision to 20/40 or worse.[7] The study found that 65% of eyes treated with argon laser photocoagulation compared to 37% of control gained 2 or more lines of vision, a difference that was statistically significant. The study investigators recommend argon laser photocoagulation for patients with BRVOs at least 3 months old and vision loss 20/40 or worse from macular edema.[7]

The Branch Vein Occlusion Study was also designed to see if peripheral scatter argon laser photocoagulation could prevent retinal neovascularization and vitreous hemorrhage.[6] It was found that neovascularization and vitreous hemorrhage in eyes with preexisting neovascularization were significantly less in treated eyes. Data from the study suggested that there was minimal risk for severe vision loss even if laser was performed after the development of neovascularization. The study recommended scatter argon laser

*Correspondence to author:
Vernon K.W. Wong MD
1481 S. King Street
Suite 423
Honolulu, Hawaii 96814

Fig. 1.—Left eye. Fundus photograph of an ischemic, superotemporal BRVO demonstrates elevated neovascularization of the disc and retina, and preretinal hemorrhage inferior to the disc.

Fig. 2.—Left eye. Venous phase fluorescein angiogram of an ischemic superotemporal BRVO reveals leakage from the disc and retinal neovascularization. The foveal avascular zone is enlarged and irregular. The superotemporal macula is hypofluorescent secondary to capillary nonperfusion.

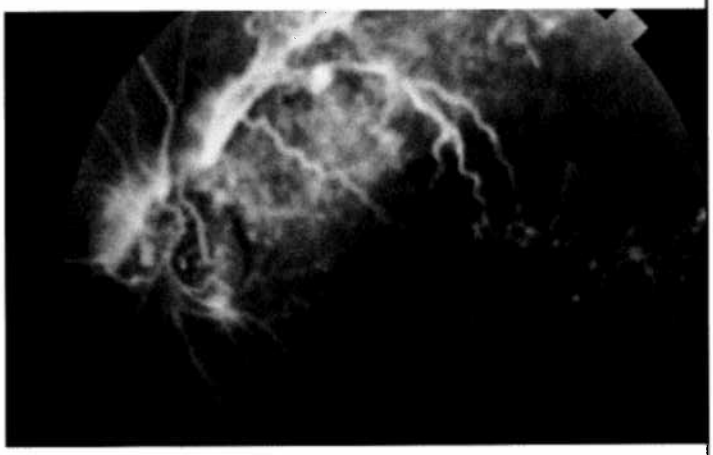


Fig. 3.—Left eye. Fundus photograph of a nonischemic CRVO demonstrates intraretinal hemorrhages in all 4 quadrants and dilated retinal veins.

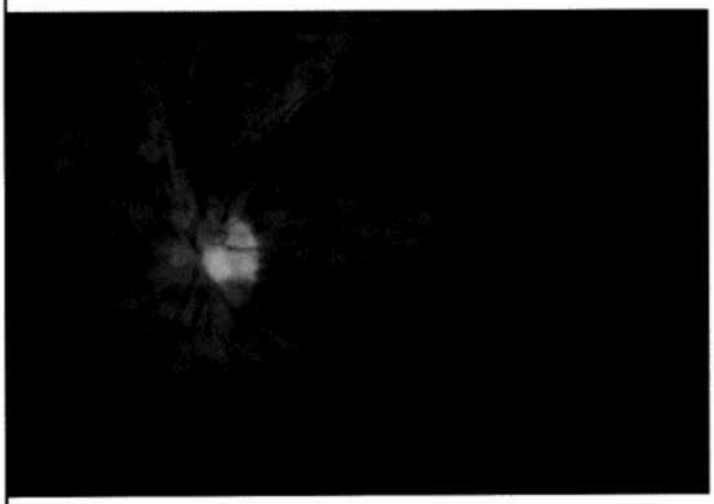
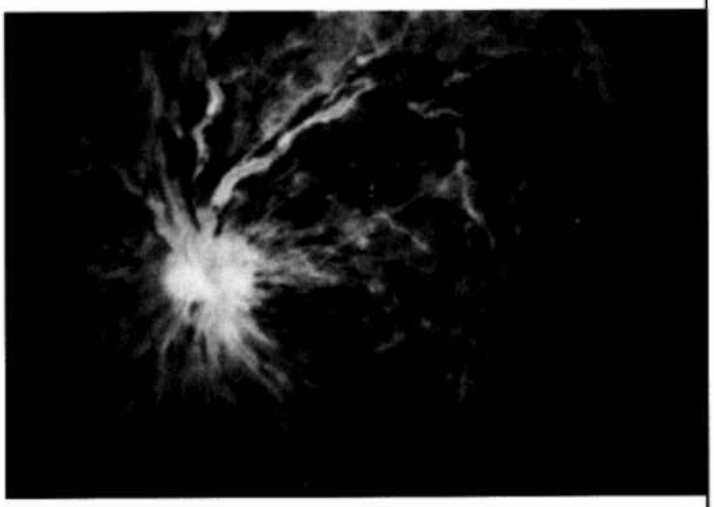


Fig. 4.—Left eye. Recirculation phase fluorescein angiogram of a nonischemic CRVO shows hyperfluorescent staining of the disc and retinal veins.



photocoagulation to areas of retinal ischemia for patients with a BRVO and neovascularization.[6]

In ischemic BRVOs with nonclearing vitreous hemorrhage or retinal detachment, vitreoretinal surgical techniques can remove the hemorrhage and reattach the retina.

Central Retinal Vein Occlusion (CRVO)

Clinical Presentation

The typical patient with a CRVO is in the 60s.[3] Patients describe sudden, painless loss of vision and occasionally, of a painful, red eye from neovascular glaucoma secondary to an ischemic CRVO.

In an acute CRVO, ophthalmoscopy reveals intraretinal hemorrhages in all 4 quadrants and dilated, tortuous retinal veins. (Fig 3) The disc may be swollen, and there may be cotton-wool spots and cystoid macular edema. Patients with an ischemic CRVO develop anterior segment or posterior segment neovascularization which manifests as new vessels on the iris, angle, disc, or retina. In longstanding CRVOs patients can develop cystoid macular edema, macular retinal pigment epithelium changes, and retinal venous collaterals.

Risk factors for CRVO include cardiovascular disease, hypertension, diabetes mellitus, hyperviscosity syndromes, and increased intraocular pressure.[1, 3, 4]

Classification

Central retinal vein occlusions are categorized into ischemic and nonischemic types. A nonischemic CRVO is defined as less than 10 disc areas of capillary nonperfusion on fluorescein angiography while an ischemic CRVO is defined as greater than 10 disc areas of capillary nonperfusion.[8,9] (Fig. 4) Clinically, patients with an ischemic CRVO have poor vision, an afferent pupillary defect, and extensive intraretinal hemorrhages.[3, 4, 8, 9]

Complications

Patients with a nonischemic CRVO may lose vision secondary to macular edema. Patients with an ischemic CRVO can lose vision from macular edema, ischemic maculopathy, neovascular glaucoma, and vitreous hemorrhage. If ischemia occurs in the macula, a patient may notice central vision loss, while ophthalmoscopy may not reveal macular edema. A fluorescein angiogram will demonstrate an enlarged, irregular foveal avascular zone.

A severe complication of an ischemic CRVO is anterior segment neovascularization which occurs in about 35% of patients.[8,9] Untreated anterior segment neovascularization can progress to neovascular glaucoma and blindness. About 18% of patients with ischemic CRVOs develop neovascularization of the retina or disc.[10] Traction from the vitreous may cause these new vessels to bleed leading to vitreous hemorrhage and decreased vision.

Treatment

Patients with a nonischemic CRVO are followed clinically for progression into an ischemic CRVO and its complications. About 15% of patients with a nonischemic CRVO progress to an ischemic CRVO within 4 months.[8,9] The Central Vein Occlusion Study was a multicenter, randomized, controlled clinical trial to see if argon laser photocoagulation could improve visual acuity in eyes with a CRVO with macular edema and vision 20/50 or worse.[11] The study found no visual acuity difference in treated and untreated eyes. Macular grid photocoagulation is not recommended for patients that meet the study entry criteria.[11]

The Central Vein Occlusion Study was also designed to see whether panretinal argon laser photocoagulation could prevent anterior segment neovascularization and neovascular glaucoma.[10] Patients with ischemic CRVOs (defined as greater than 10 disc areas of capillary nonperfusion as documented by fluorescein angiography) were treated with panretinal argon laser photocoagulation before and after development of anterior segment neovascularization. The study proved that prophylactic laser decreased the incidence of anterior segment neovascularization, but laser at the time of development of anterior segment neovascularization prevented neovascular glaucoma. The study investigators recommend careful follow-up of patients with an ischemic CRVO and panretinal photocoagulation when the patient develops two clock hours of iris neovascularization or any angle neovascularization.[10,12]

Summary

Retinal vein occlusions are a common cause of vision loss in people over age 60. Careful, serial ophthalmoscopy aids in the initial diagnosis and recognition of subsequent complications. Laser photocoagulation is used to treat macular edema and retinal neovascularization secondary to a BRVO. Laser photocoagulation is also used to prevent neovascular glaucoma in an ischemic CRVO. Occasionally, vitreoretinal surgical techniques are needed to remove chronic vitreous hemorrhage or repair a retinal detachment secondary to a retinal vein occlusion.

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